THE PROTECTION OF INFANTS AND YOUNG CHILDREN FROM TUBERCULOUS INFECTION.[1]

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Frequency of Tuberculosis. Large series of autopsies in children under fifteen years of age show tuberculosis in from 25 to 35 per cent. Tuberculosis is very rarely found in the first three months (2 per cent. to 6 per cent.), increases rapidly in frequency during the rest of the first year, and steadily up to five years, after which the increase is slower, the percentage from this time on varying between 65 per cent. and 75 per cent.

Figures obtained in this way, however, do not give a true picture of the conditions among living children. The most reliable data on this point can be obtained from autopsies on children dead of the acute infectious diseases. The figures obtained in this way from large series in different cities show a frequency of tuberculosis varying between 16 per cent. in Boston and 24 per cent. in Prague.

Fatality of Tuberculosis. While the frequency of tuberculosis increases with age, the fatality of tuberculosis diminishes steadily during the first two years, after which it remains nearly constant. In almost every case in which tuberculosis is found in the first six months it is the cause of death, while this is so in only three-fourths of the cases in the second six months, the proportion diminishing steadily with age. The fatality of tuberculosis in early life is due to the great tendency to dissemination at this age, active general tuberculosis being found in about 75 per cent. of the fatal cases, while nearly 60 per cent. die of tuberculous meningitis. Very little tendency to healing appears until the third and fourth years.

Mortality of Tuberculosis. The number of deaths from tuberculosis is almost nil during the first months of life, but increases progressively afterward, the increase being especially rapid from one to two years. The first maximum is reached between two and four years. After four years the mortality diminishes to puberty.

These facts justify the conclusions that tuberculosis is an extremely important and fatal disease in early life, well worthy of serious attention, and that it is almost never intrauterine in origin, but an acquired and hence a preventable disease. The malignancy of tuberculosis, the absence of any tendency to healing, and the great tendency to dissemination in infancy and early life are, moreover, extremely strong evidence against the verity of Behring's theory.

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During infancy and early childhood, when the mortality of tuberculosis is greatest, the child rarely leaves its home. Later, when the child plays out more and goes to school, the mortality diminishes, showing that the danger of contagion is greater at home than abroad, and that, while all sources of contagion must be considered, our attention must be devoted especially to the prevention of domestic infection. Contagion alone is not sufficient for the development of tuberculosis; there must also be a favorable soil or predisposition. Measures for the prevention of tuberculosis in childhood should, therefore, be divided into two classes: those intended to diminish the susceptibility to tuberculosis, and those intended to prevent contagion.

SUSCEPTIBILITY TO TUBERCULOSIS AND METHODS FOR DIMINISHING IT. *Heredity.* While direct heredity, either from the sperm or through the placenta, practically never occurs, and although the children of the tuberculous if removed from their parents at birth do nearly as well as the children of the non-tuberculous, it seems safe to assume that a predisposition, or better, a diminished resistance, to tuberculosis is inherited. This susceptibility is probably greater than that transmitted by other debilitated or alcoholic subjects and different from the natural predisposition of early life. Exposure to house contagion is not sufficient in itself to explain the greater frequency of tuberculosis in the children of tuberculous parents.

Theoretically, marriage should be forbidden to the tuberculous, but practically this is impossible. It should be permitted, however, only to those in whom the disease has been quiescent for several years, and who have a good constitution and a good family history.

Improper Food and Hygiene. An increased susceptibility to tuberculosis is very easily acquired as the result of improper food, bad hygienic surroundings, and lack of air and sunlight. The remedy is obvious; its application often difficult. Everything which tends to provide the poor with proper food and everything which gives the children a greater supply of fresh air and sunlight is important, in that it tends to prevent the development of this acquired susceptibility. Every new park, every new playground, every improved tenement, every vacation in the summer aids in the fight against tuberculosis.

Diseases of the Mouth and Throat. Diseases of the mouth and throat, hypertrophy of the tonsils and adenoids, especially if accompanied by cervical adenitis, all open the door for the entrance of the tubercle bacillus and should, therefore, receive early and active treatment.

Measles, Pertussis, and Influenza.. Bronchitis and measles, pertussis and influenza, if accompanied by bronchitis or throat affections, are often followed by tuberculosis. They do not, of course, cause tuberculosis, but either stir a latent tuberculosis into activity or prepare the ground for it by the lesions and general enfeeblement which they produce. Measles and whooping-cough should, therefore, be avoided if possible and, if contracted, the children should be protected even more carefully than is usual against contagion, not only during the illness but also during convalescence. The public must be taught to appreciate the dangers of measles and whooping-cough; the diseases should be reported to the Boards of Health, and patients afflicted with them should be isolated.

In short, every child that is predisposed to tuberculosis should be given a regime which will tend to make its organism more resistant. It should have proper and sufficient food, air and sunlight, cold bathing, live in the country if possible, begin school late, and have its throat put in normal condition.

METHODS OF CONTAGION AND THE MEANS TO PREVENT IT. The bacilli of tuberculosis are contained in the milk of tuberculous animals, the excretions from various tuberculous foci, and the sputum of patients with pulmonary tuberculosis. Contagion, in the vast majority of cases, occurs through sputum. The organism may be infected, in order of frequency, through the mucous membrane of the cavities of the mouth and throat, the bronchial mucosa, the intestinal mucosa, the skin, and the genital organs. Infection through the skin and the genital organs is, however, extremely unusual.

Contagion by Milk. Tubercle bacilli have been found but once in the milk of a tuberculous woman. A tuberculous woman should not nurse her child, however, even if she is able to do so, both because it debilitates her and because the infant not only suffers on account of an insufficient or abnormal supply of milk, but runs the risk of direct infection through the secretions of the respiratory tract.

This is not the place to discuss the bacteriology of human and bovine tuberculosis. It is safe to conclude, however, that the tubercle bacilli of the bovine type can produce tuberculosis in man and that they can be transmitted in foods coming from tuberculous animals, especially in the milk of cows with mammary tuberculosis. The role played by infection from animals is undoubtedly insignificant in comparison with that from the consumptive man, but it is important enough so that it would be contrary to all wisdom to relax in any way the laws formulated or the precautions now taken against bovine tuberculosis. The sale of milk or milk products of tuberculous cows should be prohibited. The tuberculin test should be used to determine the presence or absence of tuberculosis. In all cases in which there is any question as to the purity of the milk supply, the milk should be pasteurized for twenty minutes at not less than 155° F. Milk being a good culture medium and carrier of the tubercle bacillus, no one with open tuberculosis should be allowed to handle it in any way.

Contagion by Sputum. This is the usual agent of contagion. It is dangerous when either moist or dry. It is more dangerous indoors than out-of-doors, where, under favorable circumstances, the bacilli soon die. Tubercle bacilli are most numerous in the dust of the dwellings of the tuberculous and especially in the dust of the floors. Older infants and children may get the dust and dirt on their hands and put their hands in their mouths or on their food. Preisich and Schutz found tubercle bacilli in the dirt under the nails in 14 per cent. of sixty-six children between six months and two years coming to the out-patient department of the Stephanie Children's Hospital, showing the alarming possibilities of contagion in this way. Tubercle bacilli may also be carried in the fine liquid particles projected during cough, loud talking, and sneezing. The droplets may be thrown as far as a yard.

Contagion by other Tuberculous Excretions. These may carry the tubercle bacilli in the same way as the sputum and enter the body by the same portals. Direct contagion from sputum, projected droplets, kissing, and close contact is the most common method of infection in the first few months or year. When the infant begins to handle things and to get its hands dirty, indirect contagion also plays an important part.

Means to Prevent Contagion. It is comparatively easy to guard the child against contagion when there is no consumptive in the family. The child must take only pure or pasteurized milk. It must not be taken to visit consumptives or have them visit it. It must not be kissed. It must not be allowed to play where people are allowed to spit; better than this, all expectoration in public places should be prohibited. It must not go to live in a house vacated by a consumptive unless it has been thoroughly disinfected. Compulsory notification of tuberculosis will aid in accomplishing this.

It is, on the contrary, extremely difficult to guard the child against contagion when there is a consumptive in the family. This is especially true among the poorer classes where overcrowding, with the consequent increase in the opportunities for infection, is the rule, and where all or most of the causes which increase the child's susceptibility are active. The importance of family contagion is shown by the fact that Comby found parental tuberculosis in more than one-third of the cases in which he found tuberculosis at autopsy. The first principle in the treatment of these cases is to get the patient out of the house if possible. A tuberculous servant or nurse should be discharged. A parent or other member of the immediate family should leave if possible. The public should provide sanatoria or hospitals for such patients, if they are unable to take care of themselves. If, as is usually the case, the patient is obliged to stay at home, the children should, if possible, be sent away, preferably to the country. The protective influence of country life on the children of consumptives is shown by Dr. Mercier's results. Only three per cent. of the children of tuberculous parents sent to the country died, while 50 per cent. of their brothers and sisters who remained at home, perished. The work of the Society for the Protection of Children against Tuberculosis recently organized by Grancher in France is along these lines. They take, however, only children between five and thirteen years of age, as they are less liable to the diseases of early infancy, are more resistant to infection, and can be of use to the family taking them. The cost per child is one franc per day.

When the patient or the children cannot be sent away the measures taken must vary according to the circumstances in the individual case. In order to avoid direct contagion the patient and the children should be kept apart as much as possible. They should not sleep in the same room and certainly never in the same bed. Kissing must be prohibited. The patient must not cough, talk loudly, or sneeze nearer than three feet from the children. In order to avoid indirect contagion, the sputum must be taken care of and destroyed according to modern methods. Nothing used by the patient should be used by the children. The children should be kept off of the floor and out-of-doors as much as possible. The rooms must be cleaned by wiping with a moist cloth and not by sweeping and dusting. They must be aired and sunned as much as possible. In short, all the precautions which are in general use for the destruction of the sputum and the avoidance of contagion must be carried out, even more carefully than when adults only are exposed.

The results which have been obtained in New York during recent years, in consequence of the removal of advanced cases of consumption in the tenements to hospitals and of the disinfection of their apartments after their death or removal, and by the education of consumptives and their families as to the nature of the disease and the proper disposal of the sputum, as shown by the diminution in the death-rate from pulmonary tuberculosis and tuberculous meningitis in children under fifteen years of age, are most encouraging. During the ten-year period ended in 1902 the death-rate from these diseases in children was more than 40 per cent. lower than during the previous ten years, the rate in 1892 being 5 per 10,000, and in 1902, 2.96 per 10,000. Dr. Biggs justly gives as his opinion, based on the results already obtained, that with an extension of the regulations now being enforced, a wider diffusion of information as to the nature of the disease, and larger facilities for the care of advanced cases, there will be a still further and a rapid reduction in the death-rate from tuberculosis in this early period of life, and that these data afford greater encouragement in the crusade for the prevention of tuberculosis than any others which are at our command.

To sum up, the separation of children from tuberculous adults is the most simple and rational method of protecting them against contagion. Such separation, however, is often impossible. The only practicable method then is the observation in the best way possible in the individual case of the principles of hygiene and habitation. When a family is in reduced circumstances the public must step in and help them. What can be done as to the separation of the children from the patients and as to sanitation depends in each case on the circumstances of the family and the provisions for the care of the tuberculous made by the public. That is to say, protection against tuberculosis is largely a question of money.

TUBERCULOSIS AMONG THE NEGROES.[1]

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My first aim is to show the tremendous importance of the study and prevention of tuberculosis among the negroes of the United States. While it is well known that this disease is quite prevalent among negroes, few if any of us know the extent of this prevalence, and I fear that none of us realizes the serious effect of this prevalence upon the vitality of the nation and particularly upon that part which dwells in our cities.

The seriousness of the problem presented by consumption in any race depends upon three facts: (1) The extent of the disease within the race; (2) the proportion which the race forms of the total population; and (3) the proximity of the race to other races.

A glance at Chart 1, shows that the death-rate for the colored people is from two to seven times that of any other race, with the exception of the Irish, whose death-rate is about two-thirds thas of the colored. As to the extent of consumption, this chart provet that the negro death-rate is far greater than that of any other people.

A comparison of the proportion which these foreign peoples form of the total population emphasizes the seriousness of the condition among the colored people. While the negro people are eight millions and a half, or 11 per cent. of our population, only five of the twelve nationalities here mentioned are over a million in number. The Germans number six millions and a half, but their death-rate is only one-third that of the colored. The English, the Canadians, and the Scandinavians are each a little less than two millions. With a death-rate of less than a third of that of the colored, their tuberculosis problem, together with that of the other nationalities noted on the chart, becomes almost insignificant. Only the

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